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An inquiry into the nature
of pulmonary consumption, and
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tributed to its increase.
London, 1817.

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AN

I N Q U I R Y,

§c.

From Mr. Webster
May 828

AN
INQUIRY
INTO
THE NATURE
OF
PULMONARY CONSUMPTION,
AND OF
THE CAUSES
WHICH
HAVE CONTRIBUTED TO ITS INCREASE.

By H. H. TULLIDGE,
MEMBER OF THE ROYAL COLLEGE OF SURGEONS LONDON.

" IF WE WOULD BE LED BY NATURE TO INVENTION, WE SHOULD
COMMAND HER IN ACTION."

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PREFACE.

IN the following pages, where the nature of pulmonary consumption is attempted to be explained, the medical reader will observe, that the pathology of the disease is deduced from physiological evidence: as a mechanist can have no idea how to correct the irregular movements of a watch, without an acquaintance with its structure, and the dependency which one wheel has upon another; so a physician, unacquainted with the structure of the human body, and of the functions of the organs which compose it, can have no idea how to correct irregularity of action, when met with in disease. Man, at all times disposed to climb up to generals, before he has accu-

rately examined particulars, has given rise to theories as intended guides in disease, which too often mislead the inexperienced practitioner, and, like the *ignis fatuus* to the benighted wanderer, affords only a specious light, which leads into a labyrinth of confusion and dismay.

Of the physiological opinions which are advanced, some are new, and others are extended in their application to the phenomena of health and disease: some light, possibly, is thrown upon the hitherto dark and inexplicable nature of the secretions, as they relate to the circulation and properties of the blood; a subject involving the most important consequences, and promising very interesting results, to medical science: a more extensive and satisfactory view of this branch of physiology would have been given, had the nature of the work, which I had proposed to myself, required it.

It has been supposed that medical knowledge could be rendered easy to all capacities, and capable of being so understood, that persons not particularly devoted to the science, could readily comprehend it; the folly, however, of such a supposition, must be manifest to every mind capable of reflection; we know, that even the most simple arts of life, cannot be acquired without some labour and application; and how much more so is it required, in the investigation, knowledge, and cure of diseases, so intimately connected with the intricate problems of the animal economy.

Should this small work be favourably received, and the opinions therein advanced, meet the approbation and consent of those whose minds are enlightened by general knowledge, and accustomed to medical research, I shall feel gratified; inasmuch, as it will afford me some plea-

sure, in having contributed something, however small, towards the general stock of human knowledge, and towards lessening the sum of human afflictions. Under all circumstances, however, my mind will rest satisfied with the impression, that my exertions have been directed with this view, and that of ardently seeking after truth.

AN INQUIRY, &c.

PREVIOUS to our inquiry into the nature of pulmonary consumption, and of the causes which have contributed to its increase, it will be necessary, in the first place, to ascertain what are the functions of the lungs in health; and, secondly, in what consists the deviations of those functions, observed in a state of disease.

The lungs, immediately after birth, expand to the influence of the atmospheric air; the blood no longer circulates through the arterial and venous systems the same homogeneous fluid; the foramen ovale, or opening, through which the blood passed from the right into the left side of the heart, becomes closed; and the dark coloured venous blood contained in the pulmonary artery, subjected to the action of atmospheric air by the first inspiration, returns of a bright florid colour by the pulmonary veins into

the left auricle and ventricle of the heart, from whence it is distributed throughout the arterial system; the organs destined for secretion, and other important functions, and which have remained dormant in the foetal state, are now called into action: the blood thus conveyed through the system by the arteries, having lost its florid hue, is returned of a dark colour by the veins into the right auricle and ventricle of the heart, which being again distributed through the lungs, by the numerous ramifications of the pulmonary artery to the influence of the atmospheric air, and having parted with some properties injurious to animal life, and acquired others for its support, is again returned by the pulmonary veins into the left side of the heart, to be reconveyed in continuation through the system.

The contradictory opinions entertained by chemical philosophers, respecting the combination of the oxygen of the atmosphere with the blood, are sufficient to show how unsatisfactory are all conclusions drawn by direct experiments, when they refer to the actions and composition of living organized matter. M. Lavoisier was of

opinion, that both constituents of the atmosphere (oxygen and azote) were absorbed by the blood. M. M. Bichât and Richerand, two intelligent French writers on physiology, speak decidedly of the lungs imbibing oxygen. Messrs. Allen and Pepys, in England, who have made numerous experiments on respiration, but differing in their results, have concluded that no oxygen is absorbed by the blood, and that the quantity of carbonic acid gas given off at each expiration, accounts precisely for the whole of the oxygen consumed at each inspiration. Sir H. Davy, who has added so many new facts to chemistry, does not seem to have made up his mind upon this subject. In his work, entitled "Elements of Chemical Philosophy," published in 1812, he says, "In respiration, as will be more fully explained in the last part of this work, the volume of air is not changed, but a part of its oxygen disappears, and an equal bulk of carbonic acid gas is formed in its place." The second part of this work has not yet appeared.

It does not belong to the nature of this work, to enter further into detail upon the various opi-

nions entertained upon this subject; we shall direct our attention chiefly to the effects which follow the admission of atmospheric air into the lungs upon the animal economy; and from which, I trust, we shall be able to deduce such proofs and inferences as will readily dispose us to conclude, with Lavoisier, that both oxygen and azote combine with, and enter into the circulation of the blood.

In the fœtal state, as we have before remarked, black or dark coloured blood circulates in both systems of vessels; and it is from this blood that the various secretions which are about to commence in the different organs are produced. Immediately after birth, and as soon as the infant has breathed, the circulation and properties of the blood being changed by the process of respiration, a florid and thinner blood is now found in all the arteries, and a dark purple coloured blood in all the veins. If this change of *colour* was to be ascribed merely to the disengagement of an excess of carbon contained in the blood, and that its properties were not otherwise altered by the influence of the air, there is no chemi-

cal phenomenon known which can afford us any thing analogous; we know of no fluid, which, by depriving it of carbon, will, from a purple assume a red colour; but we have many familiar examples of blues and purples becoming red, when subjected to the influence of oxygen. We know also, that other gaseous matter can be inhaled by the lungs, both altering the colour and properties of the blood; and that such gaseous matter enters into the circulation, as is evident from the different effects which follow its inhalation, these facts have been confirmed by Dr. Beddoes, Sir H. Davy, and others. Nitrous oxyde, which has been the subject of frequent experiment, is remarked for the exhilarating effects which it commonly excites upon those who inhale it; this gas contains the same elements as atmospheric air, and only differs from it in the proportion of them; the former containing double the quantity of oxygen to that contained in the latter, and hence its remarkable effects upon the animal economy.

The first effects of the atmospheric air upon new-born infants, are observed in the secretion

which takes place in the kidneys, and as the arteries which supply these glands are among the first which receive the new aeriated blood, from their proximity to the arch of the aorta, so, these glands are also the first in which its effects upon the secretions are observed. I have found this effect, indeed, in many instances, within the short period of time from the birth of the infant to the tying of the funis; by micturition, which follows the tightening of the ligature; and which I have no doubt, has been frequently observed by others. I may remark here, that some of the secretions have already commenced previous to birth, and that the gall-bladder contains a peculiar kind of bile, as has been often observed in still-born infants; the appearance of the meconium which is discharged soon after birth also indicates it. We know nothing of the use of the thymus gland, which forms so distinguishing a character in the foetus, and which gradually disappears after birth; but, from its glandular structure is, no doubt, connected with some secretions necessary to foetal existence. As no digestion takes place in the stomach previous to birth, the gastric juices are not required; nor

are they ever found in the foetal state; and for the same reason—as there is no excess of fluid in the vascular circulation of the foetus, no secretion takes place in the kidneys, the excretory evacuations not being necessary to preserve the balance of the sanguiferous system.

The atmospheric air, then, by combining with, and altering the properties of the blood in the lungs, calls into action all the secreting organs in its circulation throughout the arterial system. It does not belong to our present inquiry, to enter into an examination *why* the organs from the same blood secrete fluids so different in the nature of their properties: we limit ourselves to the knowledge that they are so: we know that the health of the new-born infant depends upon the regular action of the functions of those organs destined to maintain its new existence; and that irregularity of organic action is at all times accompanied by evident marks and symptoms of disease.*

* Irregular organic action is to be understood as that which is contrary to the regular or natural organic action of health; thus in jaundice there is irregular organic action of the liver.

All the organs have an immediate or intermediate dependance upon each other: thus the stomach which receives the food, and in which the process of digestion is carried on, demands, *a priori*, the secretion of a fluid from the arteries of the stomach, and these arteries require that the blood which they contain should have been exposed to the action of the atmospheric air in the lungs. Bichât observes, *sans secretion point de digestion, sans exhalation nulle absorption, sans digestion defaut nutrition.*

The function of the lungs in health consist in having a determinate quantity of blood which circulates through them in a given time, proportioned to the general distribution: that the blood, in traversing the pulmonary structure, parts with carbon, and imbibes atmospheric air, converts the chyle, which has been absorbed by the lacteals from the food in its passage through the intestines, into new blood, and, by its general circulation, calls into action all the secreting organs, and affords nourishment to the whole system.

During the period of infancy and childhood, which may be considered to terminate about the fourteenth year, the whole system requires more nutrition than at any other period of our existence. Hence the stomach and lungs, the organs of nutrition, are almost constantly in action; the former in the process of digestion, and the latter in the sanguification of the chyle to form new blood for the support and development of all the growing organs: thus, from properties contained in the blood, the solid and compact texture of the bones are formed; the muscles increase in size, by the further addition of fibrin; and all the other organs acquire their ultimate perfection.

The period of youth, which usually commences at the fourteenth year, presents to us various important phenomena, which regulate the animal economy for the greater part of our future existence; those organs destined for the conservation of our species, and which appear to have hitherto remained dormant, are now called into action, and new secretions are established. The stomach demands food only at distant

intervals; the circulation of the blood is more uniform and slow; the lungs perform their functions involuntarily, and without our consciousness; and nutrition, afforded to the system by the stomach, exceeds, in some measure, the expenditure by the secretions and excretions.

At this period, however, a variety of causes tend to produce diseased action in the system, and from the important change which has taken place, the animal economy is more predisposed to the influence of these causes; *whenever the functions of any particular organ are impaired, diseased action is communicated to some other organ in immediate dependance upon it*: thus cold, or any other cause primarily affecting the cutaneous organs, which in part perform the functions of the lungs, by the disengagement of carbon from the surface, occasions more or less diseased action of the pulmonary organs: hence the lungs become loaded with blood, too great in quantity to be decarbonized by the ordinary respiration of health, quicker inspirations follow, and a more rapid circulation of the blood through the system takes place in consequence; this state of the lungs is a common cause of hæmoptysis, or spit-

ting of blood, which we know to be the frequent precursor of pulmonary consumption.*

The secretions which support the healthy actions of the animal economy, are also liable at this period to various interruptions; whatever tends to produce diseased actions of the secreting organs, also directly or indirectly interrupts the healthy functions of the lungs; thus, the suspension of the periodic secretions in females, or *amenorrhœa*, is a fertile source of pulmonary consumption; from the suspension of the uterine secretion, more blood circulates through the liver than is sufficient for the healthy functions of this organ; hence the usual diseased action of this viscus in almost all cases of amenorrhœa; more blood is returned by the hepatic vein into the ascending eava, and consequently an excess of blood circulates through the lungs.

From the interruption of the healthy functions of the lungs, by an excess of blood which circulates through them, the properties of the

* See Cullen's First Lines, article *haemoptysis*, DCCXXXI.

blood in the arteries become altered, and rendered less fit for the general purposes of secretion and nutrition: the *quantity* of blood which is acted upon by the atmospheric air, is greater than can be aeriated by ordinary respiration. The deep inspirations which so commonly attend complaints of the chest, and which are frequently attributed to what are called lowness of spirits, are the involuntary efforts of the organs of respiration to aeriate by due impregnation of air all the blood in the lungs.

The blood in its circulation through the arterial system being less impregnated with atmospheric air, must necessarily produce some change in all the secreting organs immediately depending on arterial blood; the important functions of the stomach first suffer, in consequence of the blood in the gastric arteries no longer containing those properties for the secretion of fluids which excited in this organ the sensation of appetite or hunger; from deficiency, either in quality or quantity of the assimilating fluid, digestion is imperfect; the food thus partially digested, excites diseased

action in its passage through the bowels, and the chyle, from defective animalization, becomes deteriorated, and less qualified for conversion into new blood.

Whatever tends to interrupt the healthy functions of the lungs, affects more or less the healthy actions of the whole system: the longer its duration, the more extensive its effects; the effects which follow this interruption, we have observed, first takes place in the stomach, then in the other organs of digestion; less blood is formed by reason of defect of chyle, and emaciation of the whole body is the consequence; hence, as the blood becomes less in quantity in the whole system, the excess of blood which primarily engorged the lungs, undergoes also a diminution, the atmospheric air is now in excess with respect to the *quantity* of blood which traverses the pulmonary structure, and all the secretions depending on its influence are increased.

Not only all the organs whose natural action is that of secretion, but the lungs also put on

a similar action; the bronchial glands, which occasionally assume a more active secretion, in catarrh, in hooping cough, and some other complaints, become the seat of constant and regular secretion; the lungs or the tubercles formed upon their surface in the early stages of the disease, partake of the same action; numerous abscesses are formed, the secretions and excretions exceed considerably nutrition, and thus are the powers of life ultimately exhausted.*

It is agreed by all medical writers, that pulmonary consumption is a disease of progressive increase, the truth of which, I think, cannot be doubted; the number of deaths in London, for one year alone, from this disease, amounted to 4750;† the average number who

* Rush, whose writings show the original conceptions of a great mind, though influenced by the medical dogmas of the schools, considered pulmonary consumption as a disease of the whole system; we have seen, from the view we have taken of it, the confirmation of this opinion.

† Heberden finds the mortality from consumption 3000, 4000, and 5000, out of 21000 in London, in the beginning, middle, and end of the 18th century. See Young's Medical Literature.

die from the same cause, in the city of New York, is about 600. Had the ancient physicians observed a fatality of this kind in their cities, they would, no doubt, have mentioned it more particularly in their writings than they appear to have done. The treatment of diseases, as followed by the ancient physicians, was for a long period confined to remedies obtained from the vegetable kingdom, to baths, and to the regulation of diet, until the time of Paraeelsus, who, about the beginning of the 16th century, for the first time introduced chemical compounds from the mineral kingdom into the practice of medicine, and particularly antimony and mercury; notwithstanding the various revolutions in medical science, the use of these remedies have been preserved up to the present time, and have been more or less extolled and employed according to the prevailing theories of the day. I shall not enter here into a critical analysis of the different opinions which have been entertained and promulgated with respect to their virtues, but merely notice the general effects which mercury appears to produce upon the animal economy.

The effects of mercury upon the human body, and particularly that preparation of it with muriatic acid, (calomel,) so generally administered in disease, are always observed in the action it excites upon the secreting organs; we can, at all times, trace its effects either to the salivary glands, the stomach, kidneys, liver, or skin, &c.; so that we may set it down as an invariable law, that mercury excites into action and promotes, more or less, the secretions of all the organs.

This being the general effects of mercury upon the animal economy, is it not very reasonable to infer that a morbid increase of the secretions is often induced by it? Among the various diseases incident to age, sex, and climate, mercury and antimony form the most prominent remedies which are employed. In infantile diseases they are commonly freely administered; and mercury is generally a principle ingredient in worm powders, fever powders, and the like. Dr. Hosack has shown great acuteness and

penetration of judgment in tracing the frequent occurrence of hydrocephalus to this cause.*

In the hands of judicious and experienced men, mercury certainly ranks among the most valuable remedies we possess; but is it too severe to say that it is generally abused? The use of it has become so general, that persons totally unacquainted with the nature of disease, recommend it as freely, and almost as largely, as a dose of rhubarb or magnesia. Good effects, no doubt, are often ascribed to it, and, perhaps, very justly; but the frequent recurrence to this active and powerful medicine, especially in such large doses as are often prescribed, is not only injurious to the system for the time being, but frequently sows the seeds of some insidious disease, which ultimately undermines the constitution, and destroys the powers of life.

The principle which guides medical men generally in the use of this remedy is, in my opinion, very deficient in its application, both in

See Dr. Dyckman's Report of Diseases in the American Monthly Magazine and Critical Review for July, 1817.

regard to the nature and cause of disease. In attempting the cure of diseases upon the principle of exciting an action contrary to that existing in disease, is a loose and crude idea, constantly running counter to experience. This idea originated from an observation of Dr. John Hunter, that no two diseases could exist in the same person at the same time; but the total inadequacy of applying this idea to the treatment of disease is too manifest to need much inquiry: for, in the *cure* of diseases we are not surely led to employ *remedies* to produce *another* disease, this would be following the footsteps of Proserpine, instead of those of Hygeia, which we profess.

The doctrines which have been taught as the fundamental principles of medical science, have all been raised upon assumed data, the *petitio principii* of logicians; and, upon these data, diseases and their method of cure have been attempted to be explained and accomplished. It will be needless to examine into the merits of the different theories which have been written, and which are now almost forgotten; but we shall

make a few observations upon the prevailing theory, or the Brunonian doctrine, which still influences, considerably, the practice of medicine in many parts of the civilized globe.

The theory of Dr. Brown consists in the changes rung upon these three words, *excitability*, direct and indirect *debility*, and the method of curing diseases upon a due regulation of what he calls *stimulants*. An excess of stimuli or excitement, exhausts the excitability, and produces what is called indirect debility, or the sthenic diathesis; and a diminution of stimuli or excitement, direct debility or the asthenic diathesis. The cure of diseases of sthenia, or indirect debility, consists in lessening the stimuli or excitement, whilst those of asthenia, or direct debility, is to be accomplished by increasing the stimuli or excitement. Much ingenuity, and plausibility of argument, is displayed in his *Elementa Medicinæ*, and much good has arisen, and possibly will arise out of it, by promoting and extending observation and inquiry. When, however, these principles are applied, either to the explanation or treatment of

disease—how totally inadequate are they to both ; how incapable of explaining the nature of a single symptom connected with disease ! The doctrine, indeed, is much more applicable to an automaton, the excitability being granted to the wires which connect the whole, and the due regulation of stimulants in the tension or slackening of them, than to the complex nature of man, the offspring and perfection of the works of Deity.

The Brunnian theory, from its supposed simplicity, and the captivating plausibility of the arguments, readily gained proselytes among those who were desirous of obtaining medical knowledge without the laborious application of years to close study and diligent research. When they were taught, that “ health and disease was the “ same state depending upon the same cause, “ that is, excitement, varying only in degree ; “ and that the powers producing both are the “ same, sometimes acting with a proper degree of “ force, at other times either with too much or “ too little ; that the whole and sole province of a “ physician is, not to look for morbid states and “ remedies, which have no existence, but to

" consider the deviation of excitement from the
" healthy standard, in order to remove it by the
" proper means;”* they flattered themselves
that this constituted the *alpha* and *omega* of
medical science. Thus the cure of pulmonary
consumption, which was considered by Brown
and his followers as an asthenic disease, or a
disease of direct debility, was confided to the
use of opium and other stimuli, from the sup-
posed diminished excitement upon the excitability
being the cause of the disease, and these stimuli
affording the means of increasing the excitement
to the fanciful *number* of the excitability of
health.

This view of the properties of opium, and
the temporary relief which it commonly af-
forded to coughs not absolutely connected with
pulmonary consumption, soon gained its admis-
tance as a domestic remedy into families, where
it was freely resorted to in all complaints, either
of an urgent or trifling nature, from the infant
of a few days old up to old age; no distinction

* Vide Brown’s Elements of Medicine, vol. 2. page 257.
London, 1804.

being made as to age, sex, particular temperament, or predisposition to disease, or to the nature or causes of disease, but administered alike to all. There is no remedy so frequently abused, and none in the whole *materia medica* which has had a more pernicious tendency towards producing chronic diseases than this. Pulmonary consumption is not the least unfrequent among them, as resulting from this dangerous and often fatal practice.

If we take a different view of the effects of opium upon the animal economy from that advanced by Dr. Brown and his advocates, we shall possibly see how its pernicious tendency can be, in some measure, accounted for. If a person in health, or only slightly indisposed, takes a moderate dose of opium or laudanum, it quickens the circulation of the blood, and brings on drowsiness and sleep; or, if the dose be large, total insensibility, with a slow pulse; we see then that the brain and nerves become torpid, in either case, from its effects. This circumstance alone is sufficient to satisfy every unbiassed mind of the absurdity of the Bruno-

nian doctrine. If the powers of life were exalted by the moderate dose, and this inferred from the quickened pulse and flushed countenance, we find that the brain and nerves, not the least important to the animal economy, have undergone diminution of action, or torpor; it would, therefore, be a contradiction in terms to admit action in one part of the system, and inaction in another, to constitute action or *excitability*. Instead, then, of more exalted action, which marks the character of vigorous health, diminution of action has followed its effects; and we may bear in mind a mathematical axiom, "things which are equal to the same are equal to one another."

The good and salutary properties of opium have been rediculously enough maintained, on the ground, that the Turks, who are said to be a "healthy and hardy race," being in the habit of chewing and swallowing it in large quantities without producing any bad effects. The steady temperature of their climate might possibly account in part for it not producing so frequently those chronic affections, which sooner or later

invariably follow its use in more changeable climates ; but there can be no doubt that many among them fall victims to those diseases.* If proofs were wanting of its pernicious and dangerous tendency, both to the powers of the mind, as well as to its injurious effects upon the body, how many thousand instances may be mentioned ! That it sometimes is an invaluable, and, indeed a divine remedy, there can be no doubt, but only in the hands of those whose judgment is matured by long study, reasoning, and observation.

* Where, among all the people of the earth, is the human mind more base and depraved than among the Turks? occupying a country which was once the seat of all that was great and noble, and situated in the most delightful and fertile part of the globe: capable, by its proximity and ready means of intercourse with the learned nations of Europe, of obtaining useful knowledge in all the sciences and the arts; showing a total apathy to all, they pass through their drowsy and idiotic existence in bestial sensuality, neglecting almost every thing which distinguishes man from the brute creation.

Is it at all surprising then, that pulmonary consumption has become so frequent a disease among us? Those predisposed to this complaint, either from particular conformation of the chest, at certain periods of life, to hereditary causes, or particular temperaments or occupations, from the practice of giving calomel, or opium, under such circumstances, in almost every trifling indisposition, is often sufficient to establish the disease; how much more pernicious is it than to give these remedies, which are so contra-indicated from the symptoms when the disease is confirmed. Can we promise ourselves to diminish the unnatural secretions of the lungs, by the remedy which we know increases all the secretions? or shall we attempt to overcome chronic diseases, by that which we know promotes them? I am aware there might have been a few instances which have been relieved, or cured by these remedies; but only in those cases where the diseased action which has taken place in the lungs is a consequence of some other primary organic disease, and that occasionally of the liver.

It will be seen, from the foregoing observations and remarks, that the causes which have contributed to the increase of pulmonary consumption are attributed to the frequent use and abuse of mercury and opium: the latter in the form of laudanum, paregoric elixir, or some quack remedy, and the former as its chemical compound, calomel. As I intend hereafter publishing my views of the mode of treatment, which appears to me should be adopted to effect the cure of this commonly fatal malady, upon principles rising out of the pathology of the disease, which has been here given, an opportunity will be then afforded me, of entering more at large into the *modus operandi* of those medicines, when administered in disease, and which, I trust will give an additional illustration to the arguments here advanced.

THE END.

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